

SUBSTITUTE FORM PTO-1390

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

ATTORNEY'S DOCKET NUMBER
12758-020001

U.S. APPLICATION NO. (If Known, see 37 CFR 1.5)
09/786604

INTERNATIONAL APPLICATION NO.
PCT/DE99/02804

INTERNATIONAL FILING DATE
3 September 1999

PRIORITY DATE CLAIMED
4 September 1998

TITLE OF INVENTION

METHOD FOR OPERATING A RADIO COMMUNICATION SYSTEM AND CORRESPONDING RADIO COMMUNICATION SYSTEM

APPLICANT(S) FOR DO/EO/US

Gerhard Ritter

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to promptly begin national examination procedures (35 U.S.C. 371(f)).
4. ☒ The US has been elected by the expiration of 19 months from the priority date (PCT Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☒ is attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ has been communicated by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ have been communicated by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
8. ☐ An English language translation of amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 16 below concern other documents or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A **FIRST** preliminary amendment.
☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information:

☒ Annexes to the International Preliminary Examination Report

☐
☐
☐
☐

CERTIFICATE OF MAILING BY EXPRESS MAIL

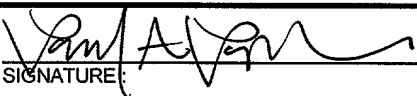
Express Mail Label No. EL 624272897 US

I hereby certify under 37 CFR §1.10 that this correspondence is being deposited with the United States Postal Service as Express Mail Post Office to Addressee with sufficient postage on the date indicated below and is addressed to the Commissioner for Patents, Washington, D.C. 20231.

March 5, 2001
Date of Deposit

Samantha Bell
Signature

Samantha Bell
Typed Name of Person Signing

U.S. APPLICATION NO. IF KNOWN 097786604		INTERNATIONAL APPLICATION NO. PCT/DE99/02804		ATTORNEY'S DOCKET NUMBER 12758-020001	
17. <input checked="" type="checkbox"/> The following fees are submitted: Basic National Fee (37 CFR 1.492(a)(1)-(5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1000 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$860 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$710 International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$690 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) \$100 <div style="text-align: right;">ENTER APPROPRIATE BASIC FEE AMOUNT =</div>				CALCULATIONS PTO USE ONLY	
Surcharge of \$130 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$0.00	
Claims	Number Filed	Number Extra	Rate		
Total Claims	14 - 20 =		x \$18	\$0.00	
Independent Claims	4 - 3 =		x \$80	\$80.00	
MULTIPLE DEPENDENT CLAIMS(S) (if applicable)			+ \$270	\$270.00	
TOTAL OF ABOVE CALCULATIONS =				\$0.00	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				\$0.00	
SUBTOTAL =				\$0.00	
Processing fee of \$130 for furnishing the English Translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f))				\$0.00	
TOTAL NATIONAL FEE =				\$0.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +				\$0.00	
TOTAL FEES ENCLOSED =				\$1,210.00	
				Amount to be refunded:	\$
				Charged:	\$
a. <input checked="" type="checkbox"/> A check in the amount of \$1,210.00 to cover the above fees is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. 06-1050 in the amount of \$0.00 to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 06-1050. A duplicate copy of this sheet is enclosed.					
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO:					
Paul A. Pysher FISH & RICHARDSON P.C. 225 Franklin Street Boston, MA 02110-2804 (617) 542-5070 phone (617) 542-8906 facsimile			<div style="text-align: center;">  SIGNATURE: Paul A. Pysher NAME <div style="text-align: center;">40,780</div> REGISTRATION NUMBER </div>		

09/786604

WO 00/14897

PCT/DE99/02804

1/2

FIG 1

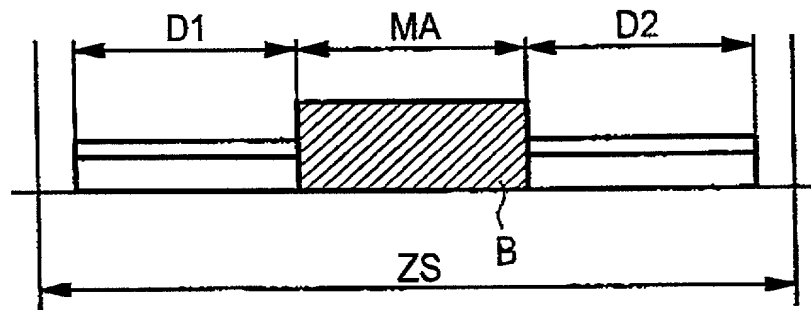
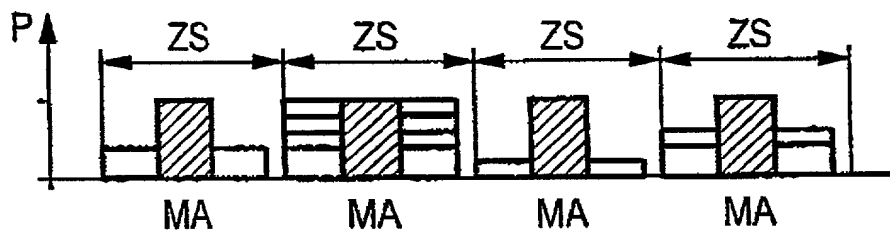


FIG 2



2/2

FIG 3

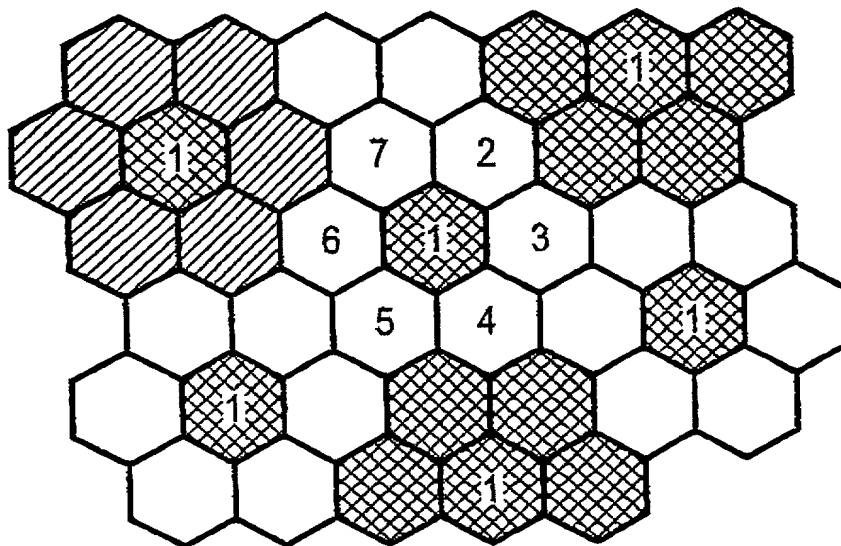
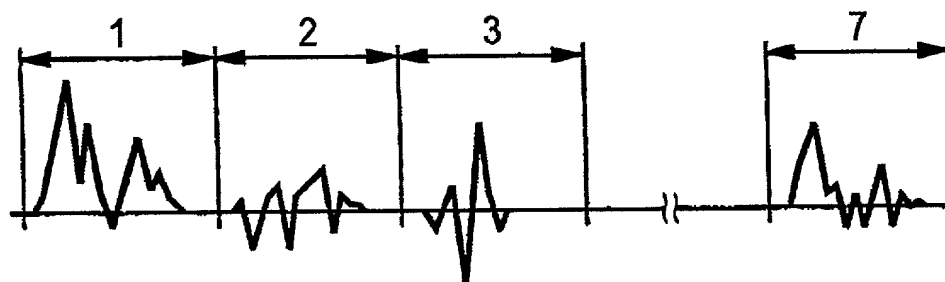


FIG 4



09/786604

Attorney's Docket No.: 12758-020001

Rec'd PCT/PTO 29 NOV 2001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Gerhard Ritter
Serial No. : 09/786,604
Filed : March 5, 2001
Title : METHOD FOR OPERATING A RADIO COMMUNICATION SYSTEM AND
CORRESPONDING RADIO COMMUNICATION SYSTEM

Art Unit : Unknown
Examiner : Unknown

BOX PCT

U.S. Patent and Trademark Office
P.O. Box 2327
Arlington, VA 22202

PRELIMINARY AMENDMENT

Prior to examination, please amend the application as follows:

In the claims:

Amend claims 1-14 as follows:

-- 1. (Amended) A method of measuring transmission characteristics of radio channels in a radio communications system having a number of base stations and a radio station, the radio communications system utilizing a timeslot structure in a time frame for transmitting data, the method comprising:

transmitting data as bursts from one of the base stations to the radio station, each burst having a channel measurement sequence, the one of the base stations transmitting the channel measurement sequence in at least one timeslot in which no data is transmitted from the one of the base stations to a radio station.

CERTIFICATE OF MAILING BY EXPRESS MAIL

Express Mail Label No. EL935340477US

I hereby certify under 37 CFR §1.10 that this correspondence is being deposited with the United States Postal Service as Express Mail Post Office to Addressee with sufficient postage on the date indicated below and is addressed to the U.S. Patent and Trademark Office, P.O. Box 2327, Arlington, VA 22202.

11-29-01
Date of Deposit

Signature

Leroy Jenkins
Typed or Printed Name of Person Signing Certificate

2. (Amended) The method as claimed in claim 1, wherein the channel measurement sequence is transmitted using at least one of (i) a constant power level and (ii) a number of base stations at the same time.

3. (Amended) The method of claim 1, wherein the channel measurement sequence is transmitted in the middle of a burst.

4. (Amended) The method of claim 1, wherein the base stations are synchronized.

5. (Amended) The method as claimed in claim 4, wherein cyclic correlation is used for channel measurement.

6. (Amended) The method as claimed in claim 5, wherein individual base stations use a same channel measurement sequence.

7. (Amended) The method as claimed in claim 6, wherein the channel measurement sequence is transmitted with a different code phase by different base stations.

8. (Amended) The method of claim 1, wherein a channel measurement sequence in a predetermined timeslot in the time frame has a special identifier.

9. (Amended) The method as claimed in claim 8, wherein a same channel measurement sequence is used in the predetermined timeslot as is used in other time slots, wherein phase modulation is used in the channel measurement sequence in the predetermined timeslot.

10. (Amended) The method as claimed in claim 9, wherein 180° phase modulation of the channel measurement sequence is used in the predetermined timeslot from one time frame to a next time frame.

11. (Amended) The method as claimed in one of claims 8, wherein the predetermined timeslot is a 0-th timeslot.

12. (Amended) A radio communications system having a number of base stations and at least one radio station which uses the method of claim 1.

13. (Amended) The radio communications system as claimed in claim 12, wherein the radio communication system is a TDD radio communication system.

14. (Amended) The radio communications system as claimed in claim 12, wherein the radio communication system is a FDD radio communication system. --

09/786,604

Applicant : Gerhard Ritter
Serial No. : 09/786,604
Filed : March 5, 2001
Page : 4

Attorney's Docket No.: 12758-020001

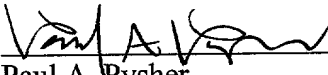
REMARKS

Entry hereof and early passage to issue are respectfully requested. Applicant's undersigned attorney can be reached at 617-521-7896.

No fee is believed to be due for this Preliminary Amendment. However, if any fee is due for this or the accompanying Response, please apply it to deposit account no. 06-1050.

Respectfully submitted,

Date: November 29, 2001


Paul A. Pysher
Reg. No. 40,780

Fish & Richardson P.C.
225 Franklin Street
Boston, Massachusetts 02110-2804
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

20351854.doc

20351854.doc

Version with markings to show changes made

In the claims:

Claims 1-14 has been amended as follows:

1. (Amended) A method of measuring [for measurement of the] transmission characteristics of [the] radio channels in a radio communications system having a number of base stations [(BS)] and a [at least one further] radio station [(MS)], [with] the radio communications system utilizing [having] a timeslot structure in a time frame for transmitting data, the method comprising:

transmitting data as [in which one of the base stations transmits data (D1, D2) in the form of] bursts from one of the base stations to [one of] the [other] radio station [stations], [with] each burst [also] having a [specific] channel measurement sequence [(MA)], the one of the base stations transmitting [characterized in that the base station transmits] the [specific] channel measurement sequence [(MA) even] in at least one timeslot [(ZS)] in which no data is [are] transmitted from the one of the base stations [station] to a [one of the other] radio station [stations].

2. (Amended) The method as claimed in claim 1, wherein [characterized in that] the channel measurement sequence is transmitted [at] using at least one of (i) a constant power level and (ii) [and/or by] a number of base stations [(BS)] at the same time.

3. (Amended) The method of claim 1, wherein [as claimed in one of the preceding claims, characterized in that] the channel measurement sequence is transmitted in the middle of a burst [(B)].

4. (Amended) The method of claim 1, wherein [as claimed in one of the preceding claims, characterized in that] the base stations [(1,...,7)] are synchronized.

5. (Amended) The method as claimed in claim 4, wherein [characterized in that] cyclic correlation is used for channel measurement.

6. (Amended) The method as claimed in claim 5, wherein [characterized in that the] individual base stations [(1,...,7)] use a [the] same channel measurement sequence.

7. (Amended) The method as claimed in claim 6, wherein [characterized in that] the channel measurement sequence is transmitted with a different code phase by [the] different [various] base stations [(1,...,7)].

8. (Amended) The method of claim 1, wherein a [as claimed in one of the preceding claims, characterized in that the] channel measurement sequence in a predetermined timeslot [(ZS)] in the time frame has a special identifier.

9. (Amended) The method as claimed in claim 8, wherein a [characterized in that the] same channel measurement sequence is used in the predetermined timeslot as is used in [as that in the] other time slots [(ZS) is used], wherein [with] phase modulation is [being] used in the channel measurement sequence in the predetermined timeslot [(ZS)].

10. (Amended) The method as claimed in claim 9, wherein [characterized in that] 180° phase modulation of the channel measurement sequence is used in the predetermined timeslot [(ZS) is used] from one time frame to a [the] next time frame.

11. (Amended) The method as claimed in one of claims 8 [-10], wherein [characterized in that] the predetermined timeslot [(ZS)] is a [the] 0-th timeslot.

12. (Amended) A radio communications system having a number of base stations [(BS)] and at least one radio station [(MS)] using the method as claimed in one of claims 1 to 11] which uses the method of claim 1.

13. (Amended) The radio communications system [apparatus] as claimed in claim 12, wherein the radio communication system is [with said apparatus being] a TDD radio communication system.

14. (Amended) The radio communications system [apparatus] as claimed in claim 12, wherein the radio communication system is [with said apparatus being] a FDD radio communication system.

WO 00/14897

Description

Method for operation of a radio communications system,
and such a radio communications system.

5

The invention relates to a method for operation
of a radio communications system and such a radio
communications system, in particular a mobile radio
system with TDD subscriber separation, in which the
10 transmission characteristics of the radio channels are
determined.

In radio communications systems, information
(for example voice, video or other data) is transmitted
by means of electromagnetic waves via a radio interface
15 between a base station and a mobile station. The
electromagnetic waves are in this case emitted as
carrier frequencies which lie in the frequency band
intended for the respective system. Frequencies in the
frequency band around approximately 2000 MHz have been
20 provided for future mobile radio systems using TD/CDMA
transmission methods via the radio interface, such as
the UMTS (Universal Mobile Telecommunications System),
or other third-generation systems.

Broadband TD-CDMA, namely a multiple access
25 concept based on a time, frequency and code division
multiplexing concept, has been selected as the
transmission method for the TDD component of the
concept for the third generation of mobile radios, such
as the already mentioned UMTS. For UMTS, the TDD
30 transmission method (Time Division Duplex) comprises a
TMDA frame having a duration of 10 ms which is
subdivided into 16 timeslots having a duration of 625
 μ s, so that 16 timeslots are available per frame. The
timeslots are split into timeslots for the uplink and
35 downlink. The switching point between the uplink and
the downlink

can be shifted in the TDD frame in order to support asymmetric traffic. A precise definition of the TDD component of the proposed UMTS system can be found in the proposal "Draft ITU system description for the UTRA
5 TDD component", ETSI SMG2 UMTS-L1, Tdoc SMG2 UMTS-L1 194/98.

Within each time slot with a length of 625 μ s, the user signals are additionally separated by means of spread codes. This means that more than one burst of a
10 corresponding length can be transmitted within one timeslot. This number of bursts within the same timeslot may be allocated not only to different users but also partially or entirely to a single user. Different spread codes are used for the large number of
15 bursts within the same timeslot, in order to make it possible to distinguish between the various bursts.

The following problems in a third-generation mobile radio system have not yet been satisfactorily solved,

- 20 - carrying out rapid measurement of the base station in use and the adjacent base station,
- rapid handover of a mobile station to another base station,
- elimination of interference signals, and
- 25 - position finding by the radio station (mobile station).

The invention is thus based on the object of providing a method and an apparatus which allow rapid and simple measurement of the base station in use and
30 adjacent base stations.

The object is achieved by the features of claims 1 and 12. Preferred embodiments of the invention are the subject matter of the dependent claims.

In the method according to the invention for
5 measurement of the transmission characteristics of the
radio channels in a radio communications system having
a number of base stations and at least one further
radio station, time frames with a timeslot structure
are used for transmission in the radio communications
10 system, and bursts are transmitted in each timeslot. In
this case, channel measurement sequences are
transmitted independently of the data transmission. In
contrast to conventional procedures in TDMA (time
division multiple access) transmission systems, the
15 primary front is not minimizing interference, but rapid
channel measurement with the measures that are
dependent on it, such as position finding and
handovers.

The base stations which are involved are
20 preferably synchronized to one another. Furthermore, the
channel measurement sequence is transmitted continuously
at a constant power level. If a number of base stations
are transmitting at the same time, then details relating
to a number of channels will be available immediately.
25 The channel measurement sequence is preferably
transmitted in the middle of a burst, with cyclic
correlation being used for channel measurement.

Particular advantages result, irrespective of
the continuous transmissions of the channel measurement
30 sequences, if individual base stations use the same
channel measurement sequence. If the identical channel
measurement sequence used for the individual base
stations is transmitted by the various base stations
using a different code phase, then this results in the
35 channel measurement results being separate in time in
the individual measurement windows of the correlation
result. The channel characteristics of the various base
stations, and the distances to them, can be determined
from the measurements.

Furthermore, the channel measurement sequence in a predetermined timeslot in the time frame may have a special identifier. In this case, the same channel measurement sequence is preferably used as that for the other timeslots, with phase modulation being used for the channel measurement sequence in the predetermined timeslot. 180° phase modulation of the channel measurement sequence in the predetermined timeslot is preferably used from one time frame to the next. This allows a predetermined time slot in the time frame to be identified uniquely, with the 0-th timeslot (the first timeslot in a frame) preferably being identified in this way.

The invention furthermore relates to a radio communications system having a number of base stations (BS) and at least one radio station (MS) which use the method described above.

The method according to the invention can be used for both TDD and FDD systems.

The particular advantages of the invention are that the channel measurement sequences are transmitted continuously at a constant power level, irrespective of the content or the power level of the data sections. The introduction of synchronization of the timeslots and use of measurement sequences based on cyclic correlation results in a reduction in interference from adjacent cells. Single-code or multi-code operation of the radio system is possible.

One preferred embodiment of the invention will be explained in the following text with reference to the drawings.

Figure 1 shows a schematic illustration of a burst in a timeslot with a channel measurement sequence and data sections,

Figure 2 shows various bursts with a constant channel measurement sequence power level,

Figure 3 shows cells of adjacent base stations with typical reuse of the code phases, and

5 Figure 4 shows the measurement window of a mobile station with seven sections.

The preferred embodiment of the invention explained in the following text is based on a radio system having a timeslot structure and, to assist
10 understanding, on time synchronization of the adjacent base stations. Various methods are known for achieving time synchronization. However, synchronization is not a precondition for the functionality of the method. If the delay times between base stations and mobile
15 stations are short in comparison to the duration of a timeslot, then the timeslots are also synchronized in the mobile stations. Assuming ideal synchronization of the base stations, the only delays which occur are those which result from the differences in the
20 distances between the respective mobile stations and the various base stations. Such delays increase with the distance to the base stations.

Figure 1 shows a schematic illustration of a burst B in a timeslot ZS. Bursts B which last for a
25 shorter period than that of the timeslots ZS themselves are transmitted in each such timeslot ZS. The guard time which results from this is intended to avoid interference resulting from different delay times and synchronization errors. A channel measurement sequence
30 is transmitted during each burst B in order to measure the transmission characteristics of the radio channels. This channel measurement sequence is preferably transmitted in the middle of each

burst (shown black, so-called Midamble MA). A time frame duration of 10 ms is assumed as a numerical example. This time frame is subdivided into 16 timeslots of 625 μ s. A burst comprises, for example, two data blocks D1 and D2 each having a duration of 200 μ s and a channel measurement sequence, MA (Midamble) with a duration of 200 μ s in the middle between the two data blocks D1, D2. This results in a total burst duration of 600 μ s, with the remaining 25 μ s in each timeslot being used as a guard time. Information can be transmitted in the data blocks D1, D2 to one or more radio stations MS. In this case, in addition to one transmission channel, a number of transmission channels may also be active at the same time, being separated from one another by different codes. One preferred embodiment for different codes is based on a Walsh-Hadamard-Transformation.

If it is further assumed that cyclic correlation is used for channel measurement, then the individual base stations can use the same channel measurement sequence, but with this channel measurement sequence being transmitted with a different code phase by the various base stations. Cyclic correlation in the receivers of the mobile stations MS then results in the channel measurement results from the various base stations being separated in time in the individual measurement windows of the correlation result. Measurement windows of 25 μ s each result with the above numerical values when there are, for example, seven different equidistant code phases. As long as the sum of the delay spread, synchronization uncertainty and differences in the distances to the various base stations remains less than 25 μ s, there will be no mutual interference between the received channel measurement sequences from the various base stations. Thus, with regard to adjacent base stations, the channel measurement method is orthogonal, even though the measurement sequences are transmitted at the same time and are also received at the same time

in the mobile stations. With the above numerical example, 15 μ s, for example, is available for the measurement of the delay spread (signal scattering) and 10 μ s for synchronization uncertainties and distance differences, or 5 μ s for the measurement of the delay spread and 20 μ s for synchronization uncertainties and delay time differences, without any interference occurring in the channel measurement.

As already stated, provided the distances between the base stations are not too great, the synchronization means that the channel measurement sequences based on cyclic correlation are orthogonal. All the base stations can thus transmit the channel measurement sequences continuously and at a constant power level. The data blocks D1, D2 themselves can be transmitted at a different power level, or may be omitted completely, as is illustrated in Figure 2, when the power level P of the data blocks D1, D2 and the Midamble MA for various power levels of the data blocks D1, D2 are plotted in the vertical direction. The power level of the channel measurement sequence in the Midamble MA is always constant. This applies, for example, to timeslots in which the respective base station is not connected to any radio station at that time. With the synchronization of the timeslots and various code phases, the channel measurements by the mobile stations provide measured values for the transmission characteristics and attenuation levels relating to the various base stations, without data transmission interfering with these measurements.

With the above numerical example, adjacent base stations use a code phase stagger of 25 μ s. In the above example, the code phase is repeated after 7 base stations. This thus results in a "re-use cluster" of 7 for re-use of the same code phases for channel measurement by the mobile stations, as is illustrated in Figure 3. With the above numerical example, a mobile

station can measure the transmission characteristics of up to 7 base stations by evaluation of the received channel measurement sequences in a single timeslot, as is shown by the schematically illustrated measurement window in Figure 4. In principal, "re-use clusters" other than 7 can also be used, for example 3,4,6,7,9 etc. The larger the chosen "re-use cluster" size, the less is the possible interference from other base stations with the same code phase from beyond normal ranges.

A further advantage, in addition to rapid measurement of the base stations, is that one radio station can be handed over quickly from one base station to another base station, provided the timeslots are synchronized. A radio station can measure a greater number of adjacent base stations at the same time in one timeslot (in the above example up to six adjacent base stations) by evaluation of the channel measurement in a single timeslot ZS. A radio station can thus be handed over from one base station to another base station from one time frame to the next, subject to the fixed base stations and the fixed network having appropriate capabilities. Interruption-free handover to another base station is thus feasible. The method allows very high rates of reaction to changes in the radio environment, for example resulting from the speeds of the radio stations (single look MAHO).

Continuous transmission of the channel measurement sequences in the proposed radio system allows the radio stations to measure the transmission characteristics relating to various base stations in the (passive) reception mode during each Midamble and, furthermore, allows the differences in the distances to the various base stations to be determined from the delay time differences. This allows passive operation

for finding the positions of the mobile stations without the radio stations themselves having to transmit signals, and thus without loading the transmission capacity of the radio system. In principle, the differences between the distances to three base stations are sufficient for position finding. The possibility of simultaneous measurement of up to 7 base stations in the example quoted here in general allows an increase in the measurement accuracy owing to the redundancy of the measured values obtained from the distance differences. In Figure 4, for example, the differences in the distances to up to seven base stations would be possible for the middle cluster in Figure 3. Channel measurement sequences received from more than normal ranges have no adverse effect on the measurement accuracy of the position finding process, since such signals occur later in time than the front edges of the channel impulse responses of the base stations which are to be measured and which are significant for distance difference measurement. The accuracy of the position finding process is dependent on the synchronization accuracy of the base stations and resolution of the channel measurement, and thus on the bandwidth of the radio system. The information required for position finding, such as the position of the base stations and of the adjacent base stations, can be transmitted cyclically via a broadcast channel. Since position finding requires only the evaluation of received signals, any desired number of radio stations can determine their present position. This characteristic is important, for example, for telematics applications.

In one preferred development, the timeslot 0 in the time frame is identified in a particular manner. However, it is preferable to use the same channel measurement sequence as in the other timeslots. The channel measurement sequences can thus be phase-modulated in the timeslot 0. In the simplest case, phase modulation of 180° can be used from one time

frame to the next. Thus, if the mobile station is stationary, this results in this timeslot producing a result

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999
1000
1001
1002
1003
1004
1005
1006
1007
1008
1009
1010
1011
1012
1013
1014
1015
1016
1017
1018
1019
1020
1021
1022
1023
1024
1025
1026
1027
1028
1029
1030
1031
1032
1033
1034
1035
1036
1037
1038
1039
1040
1041
1042
1043
1044
1045
1046
1047
1048
1049
1050
1051
1052
1053
1054
1055
1056
1057
1058
1059
1060
1061
1062
1063
1064
1065
1066
1067
1068
1069
1070
1071
1072
1073
1074
1075
1076
1077
1078
1079
1080
1081
1082
1083
1084
1085
1086
1087
1088
1089
1090
1091
1092
1093
1094
1095
1096
1097
1098
1099
1100
1101
1102
1103
1104
1105
1106
1107
1108
1109
1110
1111
1112
1113
1114
1115
1116
1117
1118
1119
1120
1121
1122
1123
1124
1125
1126
1127
1128
1129
1130
1131
1132
1133
1134
1135
1136
1137
1138
1139
1140
1141
1142
1143
1144
1145
1146
1147
1148
1149
1150
1151
1152
1153
1154
1155
1156
1157
1158
1159
1160
1161
1162
1163
1164
1165
1166
1167
1168
1169
1170
1171
1172
1173
1174
1175
1176
1177
1178
1179
1180
1181
1182
1183
1184
1185
1186
1187
1188
1189
1190
1191
1192
1193
1194
1195
1196
1197
1198
1199
1200
1201
1202
1203
1204
1205
1206
1207
1208
1209
1210
1211
1212
1213
1214
1215
1216
1217
1218
1219
1220
1221
1222
1223
1224
1225
1226
1227
1228
1229
1230
1231
1232
1233
1234
1235
1236
1237
1238
1239
1240
1241
1242
1243
1244
1245
1246
1247
1248
1249
1250
1251
1252
1253
1254
1255
1256
1257
1258
1259
1260
1261
1262
1263
1264
1265
1266
1267
1268
1269
1270
1271
1272
1273
1274
1275
1276
1277
1278
1279
1280
1281
1282
1283
1284
1285
1286
1287
1288
1289
1290
1291
1292
1293
1294
1295
1296
1297
1298
1299
1300
1301
1302
1303
1304
1305
1306
1307
1308
1309
1310
1311
1312
1313
1314
1315
1316
1317
1318
1319
1320
1321
1322
1323
1324
1325
1326
1327
1328
1329
1330
1331
1332
1333
1334
1335
1336
1337
1338
1339
1340
1341
1342
1343
1344
1345
1346
1347
1348
1349
1350
1351
1352
1353
1354
1355
1356
1357
1358
1359
1360
1361
1362
1363
1364
1365
1366
1367
1368
1369
1370
1371
1372
1373
1374
1375
1376
1377
1378
1379
1380
1381
1382
1383
1384
1385
1386
1387
1388
1389
1390
1391
1392
1393
1394
1395
1396
1397
1398
1399
1400
1401
1402
1403
1404
1405
1406
1407
1408
1409
1410
1411
1412
1413
1414
1415
1416
1417
1418
1419
1420
1421
1422
1423
1424
1425
1426
1427
1428
1429
1430
1431
1432
1433
1434
1435
1436
1437
1438
1439
1440
1441
1442
1443
1444
1445
1446
1447
1448
1449
1450
1451
1452
1453
1454
1455
1456
1457
1458
1459
1460
1461
1462
1463
1464
1465
1466
1467
1468
1469
1470
1471
1472
1473
1474
1475
1476
1477
1478
1479
1480
1481
1482
1483
1484
1485
1486
1487
1488
1489
1490
1491
1492
1493
1494
1495
1496
1497
1498
1499
1500
1501
1502
1503
1504
1505
1506
1507
1508
1509
1510
1511
1512
1513
1514
1515
1516
1517
1518
1519
1520
1521
1522
1523
1524
1525
1526
1527
1528
1529
1530
1531
1532
1533
1534
1535
1536
1537
1538
1539
1540
1541
1542
1543
1544
1545
1546
1547
1548
1549
1550
1551
1552
1553
1554
1555
1556
1557
1558
1559
1560
1561
1562
1563
1564
1565
1566
1567
1568
1569
1570
1571
1572
1573
1574
1575
1576
1577
1578
1579
1580
1581
1582
1583
1584
1585
1586
1587
1588
1589
1590
1591
1592
1593
1594
1595
1596
1597
1598
1599
1600
1601
1602
1603
1604
1605
1606
1607
1608
1609
1610
1611
1612
1613
1614
1615
1616
1617
1618
1619
1620
1621
1622
1623
1624
1625
1626
1627
1628
1629
1630
1631
1632
1633
1634
1635
1636
1637
1638
1639
1640
1641
1642
1643
1644
1645
1646
1647
1648
1649
1650
1651
1652
1653
1654
1655
1656
1657
1658
1659
1660
1661
1662
1663
1664
1665
1666
1667
1668
1669
1670
1671
1672
1673
1674
1675
1676
1677
1678
1679
1680
1681
1682
1683
1684
1685
1686
1687
1688
1689
1690
1691
1692
1693
1694
1695
1696
1697
1698
1699
1700
1701
1702
1703
1704
1705
1706
1707
1708
1709
1710
1711
1712
1713
1714
1715
1716
1717
1718
1719
1720
1721
1722
1723
1724
1725
1726
1727
1728
1729
1730
1731
1732
1733
1734
1735
1736
1737
1738
1739
1740
1741
1742
1743
1744
1745
1746
1747
1748
1749
1750
1751
1752
1753
1754
1755
1756
1757
1758
1759
1760
1761
1762
1763
1764
1765
1766
1767
1768
1769
1770
1771
1772
1773
1774
1775
1776
1777
1778
1779
1780
1781
1782
1783
1784
1785
1786
1787
1788
1789
1790
1791
1792
1793
1794
1795
1796
1797
1798
1799
1800
1801
1802
1803
1804
1805
1806
1807
1808
1809
1810
1811
1812
1813
1814
1815
1816
1817
1818
1819
1820
1821
1822
1823
1824
1825
1826
1827
1828
1829
1830
1831
1832
1833
1834
1835
1836
1837
1838
1839
1840
1841
1842
1843
1844
1845
1846
1847
1848
1849
1850
1851
1852
1853
1854
1855
1856
1857
1858
1859
1860
1861
1862
1863
1864
1865
1866
1867
1868
1869
1870
1871
1872
1873
1874
1875
1876
1877
1878
1879
1880
1881
1882
1883
1884
1885
1886
1887
1888
1889
1890
1891
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901
1902
1903
1904
1905
1906
1907
1908
1909
1910
1911
1912
1913
1914
1915
1916
1917
1918
1919
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
1933
1934
1935
1936
1937
1938
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
2048
2049
2050
2051
2052
2053
2054
2055
2056
2057
2058
2059
2060
2061
2062
2063
2064
2065
2066
2067
2068
2069
2070
2071
2072
2073
2074
2075
2076
2077
2078
2079
2080
2081
2082
2083
2084
2085
2086
2087
2088
2089
2090
2091
2092
2093
2094
2095
2096
2097
2098
2099
2100
2101
2102
2103
2104
2105
2106
2107
2108
2109
2110
2111
2112
2113
2114
2115
2116
2117
2118
2119
2120
2121
2122
2123
2124
2125
2126
2127
2128
2129
2130
2131
2132
2133
2134
2135
2136
2137
2138
2139
2140
2141
2142
2143
2144
2145
2146
2147
2148
2149
2150
2151
2152
2153
2154
2155
2156
2157
2158
2159
2160
2161
2162
2163
2164
2165
2166
2167
2168
2169
2170
2171
2172
2173
2174
2175
2176
2177
2178
2179
2180
2181
2182
2183
2184
2185
2186
2187
2188
2189
2190
2191
2192
2193
2194
2195
2196
2197
2198
2199
2200
2201
2202
2203
2204
2205
2206
2207
2208
2209
2210
2211
2212
2213
2214
2215
2216

whose mathematical sign alternates, and this makes it simple to distinguish this from the results from the other timeslots. If the radio stations are moving, shifts arise from the Doppler effect that occurs, but
5 the timeslot 0 can be identified uniquely from the other timeslots.

The explained method is not limited to TDD radio systems, but can also be used in FDD systems in which timeslots are likewise used. Furthermore, the
10 system according to the invention can be operated with different frequency repetition factors (frequency re-use clusters). Preferred embodiments are frequency re-use clusters of 1, 3 and 4.

Patent Claims

1. A method for measurement of the transmission characteristics of the radio channels in a radio communications system having a number of base stations (BS) and at least one further radio station (MS), with the radio communications system having a timeslot structure in a time frame, in which one of the base stations transmits data (D1, D2) in the form of bursts to one of the other radio stations, with each burst also having a specific channel measurement sequence (MA), characterized in that the base station transmits the specific channel measurement sequence (MA) even in at least one timeslot (ZS) in which no data are transmitted from the base station to one of the other radio stations.
2. The method as claimed in claim 1, characterized in that the channel measurement sequence is transmitted at a constant power level and/or by number of base stations (BS) at the same time.
3. The method as claimed in one of the preceding claims, characterized in that the channel measurement sequence is transmitted in the middle of a burst (B).
4. The method as claimed in one of the preceding claims, characterized in that the base stations (1,...,7) are synchronized.
5. The method as claimed in claim 4, characterized in that cyclic correlation is used for channel measurement.
6. The method as claimed in claim 5,

characterized

in that the individual base stations (1,...,7) use the same channel measurement sequence.

7. The method as claimed in claim 6,

5 characterized

in that the channel measurement sequence is transmitted with a different code phase by the various base stations (1,...,7).

8. The method as claimed in one of the preceding
10 claims,

characterized

in that the channel measurement sequence in a predetermined timeslot (ZS) in the time frame has a special identifier.

15 9. The method as claimed in claim 8,

characterized

in that the same channel measurement sequence as that in the other time slots (ZS) is used, with phase modulation being used in the channel measurement
20 sequence in the predetermined timeslot (ZS).

10. The method as claimed in claim 9,

characterized

in that 180° phase modulation of the channel measurement sequence in the predetermined timeslot (ZS)
25 is used from one time frame to the next.

11. The method as claimed in one of claims 8-10,

characterized

in that the predetermined timeslot (ZS) is the 0-th timeslot.

30 12. A radio communications system having a number of base stations (BS) and at least one radio station (MS) using the method as claimed in one of claims 1 to 11.

13. The apparatus as claimed in claim 12, with said
35 apparatus being a TDD radio communication system.

14. The apparatus as claimed in claim 12, with said apparatus being a FDD radio communication system.

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: (Name und Registrationsnummer anführen)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

Customer No. 26161

And I hereby appoint

Telefongespräche bitte richten an:
(Name und Telefonnummer)


Direct Telephone Calls to: (name and telephone number)

Ext. _____

Postanschrift:

Send Correspondence to:

Fish & Richardson P.C.
225 Franklin Street 02110-2804 Boston, MA
Telephone: +1 617-542 5070 and Facsimile +1 617-542 8906
or
Customer No. 26161

Voller Name des einzigen oder ursprünglichen Erfinders:		Full name of sole or first inventor:	
GERHARD RITTER		GERHARD RITTER	
Unterschrift des Erfinders	Datum	Inventor's signature	Date
	20/11/2001		
Wohnsitz		Residence	
THAINING, DEUTSCHLAND		THAINING, GERMANY	
Staatsangehörigkeit		Citizenship	
DE		DE	
Postanschrift		Post Office Address	
MUEHLWEG 1		MUEHLWEG 1	
86943 THAINING		86943 THAINING	
Voller Name des zweiten Miterfinders (falls zutreffend):		Full name of second joint inventor, if any:	
Unterschrift des Erfinders	Datum	Second Inventor's signature	Date
Wohnsitz		Residence	
Staatsangehörigkeit		Citizenship	
Postanschrift		Post Office Address	

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

Declaration and Power of Attorney For Patent Application

Erklärung Für Patentanmeldungen Mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

Verfahren zum Betreiben eines Funk-Kommunikationssystems und
derartiges Funk-Kommunikationssystem

deren Beschreibung

(zutreffendes ankreuzen)

☐ hier beigefügt ist.

☒ am 03.09.1999 als

PCT internationale Anmeldung

PCT Anmeldungsnummer PCT/DE99/02804

eingereicht wurde und am _____
abgeändert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Method for operating a radio
communication system and
corresponding radio communication
system

the specification of which

(check one)

☐ is attached hereto.

☒ was filed on 03.09.1999 as

PCT international application

PCT Application No. PCT/DE99/02804

and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign applications
Priorität beansprucht

Priority Claimed

19840507.3

DE

04.09.1998

☒

☐

(Number)
(Nummer)

(Country)
(Land)

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

Yes
Ja

No
Nein

(Number)
(Nummer)

(Country)
(Land)

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

☐
Yes
Ja

☐
No
Nein

(Number)
(Nummer)

(Country)
(Land)

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

☐
Yes
Ja

☐
No
Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

PCT/DE99/02804

(Application Serial No.)
(Anmeldeseriennummer)

03.09.1999

(Filing Date D, M, Y)
(Anmeldedatum T, M, J)

(Status)
(patentiert, anhängig,
aufgegeben)

(Status)
(patented, pending,
abandoned)

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date D,M,Y)
(Anmeldedatum T, M, J)

(Status)
(patentiert, anhängig,
aufgeben)

(Status)
(patented, pending,
abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.